

# **Transition of Suomi National Polar-Orbiting Partnership (S-NPP) Data Products for Operational Weather Forecasting Applications**

(A54F-08)

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AGU Fall Meeting  
San Francisco, California 3-7 Dec 2012

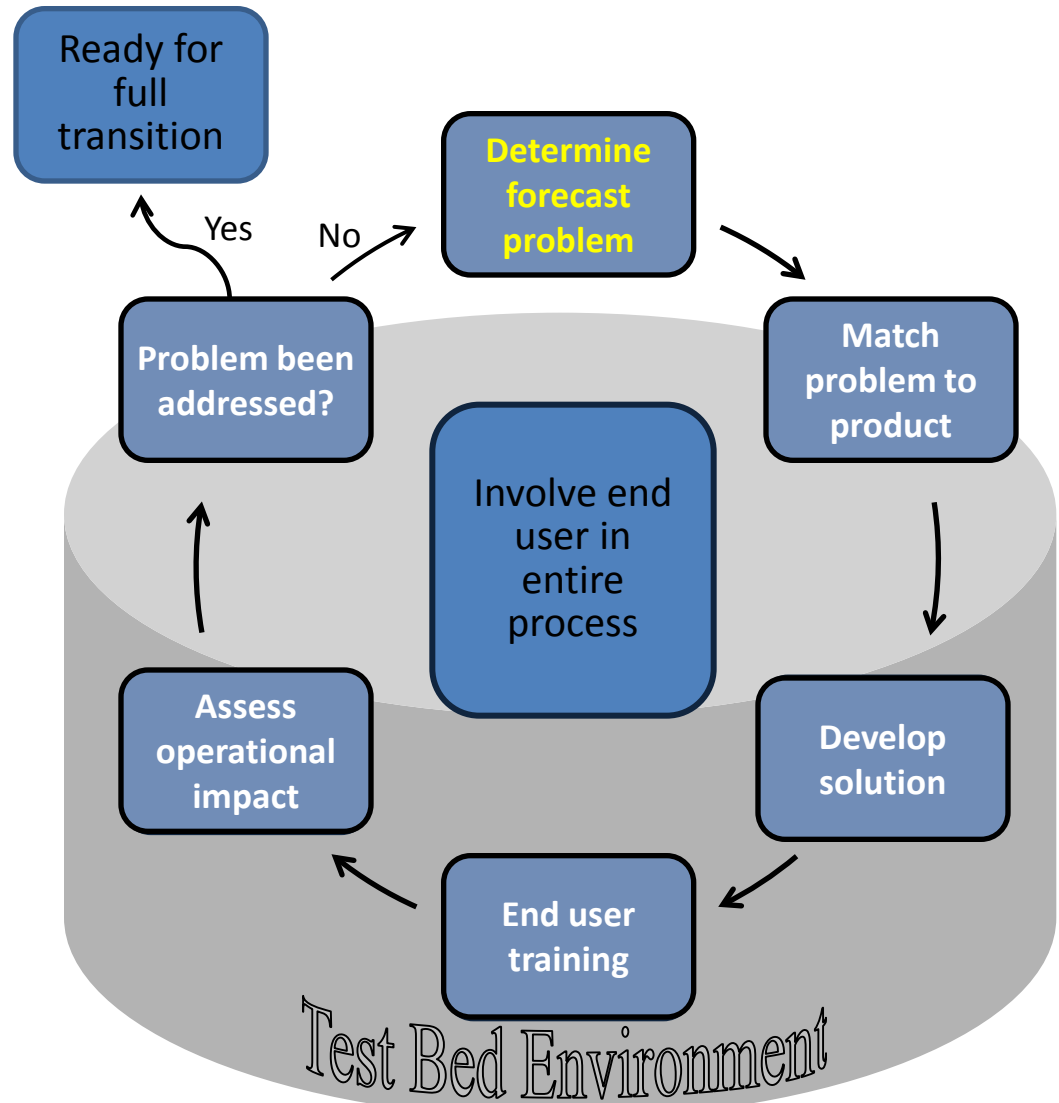
# Short-term Prediction Research & Transition

- SPoRT is a team of NASA / NOAA scientist focused on demonstrating the utility of NASA and future NOAA data and derived products on improving short-term weather forecasts
- Work collaboratively with a suite of unique products and selected WFOs in an end-to-end transition activity
- Stable funding from NASA and NOAA
- Recognized by the science community as the “go to” place for transitioning experimental and research data to the operational weather community
- Endorsed by NWS ESSD/SSD chiefs
- Proven paradigm for transitioning satellite observations and modeling capabilities to operations (R2O)

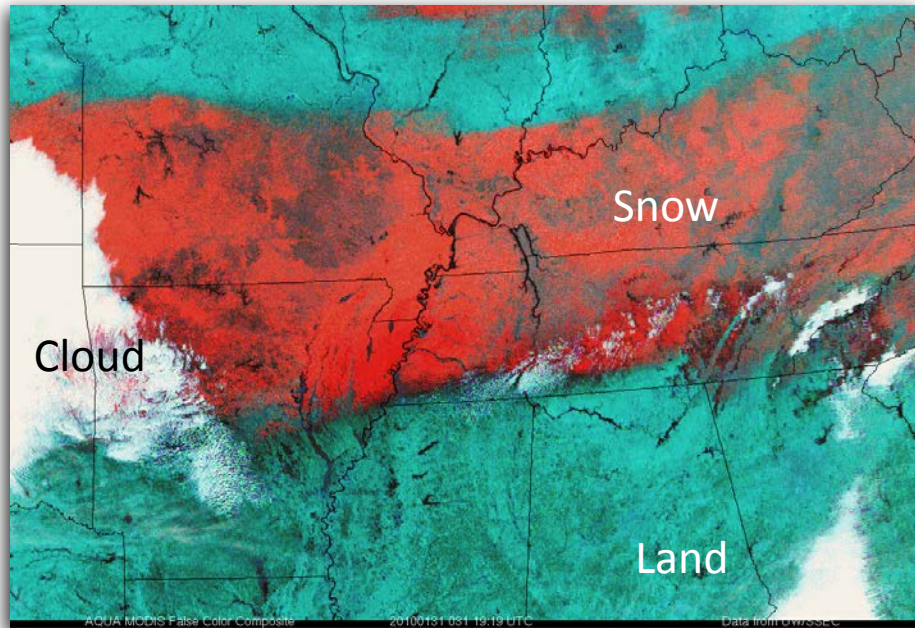


# SPoRT Paradigm

- Interactive partnership
- Integrate end user's decision support tools
- Create product training
- Perform product assessment
- Bridges the "R2O Valley of Death"



# Successes with MODIS



**AQUA MODIS “False Color” Composite**  
**1/31/10 Heavy Snowfall Event**

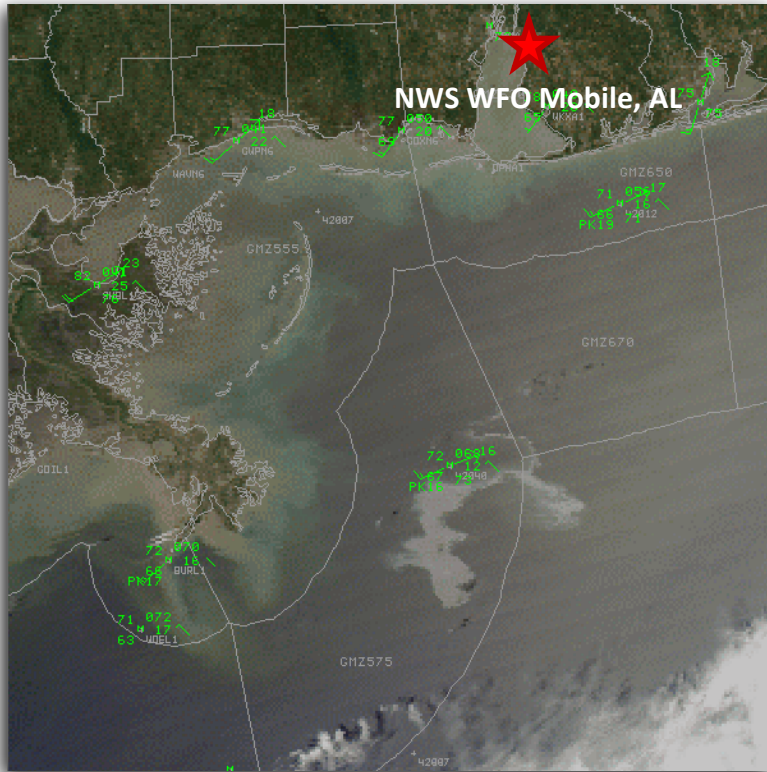


**AQUA MODIS Fog Product**  
**8/9/09 WFO Morristown, TN Local Fog Advisory**

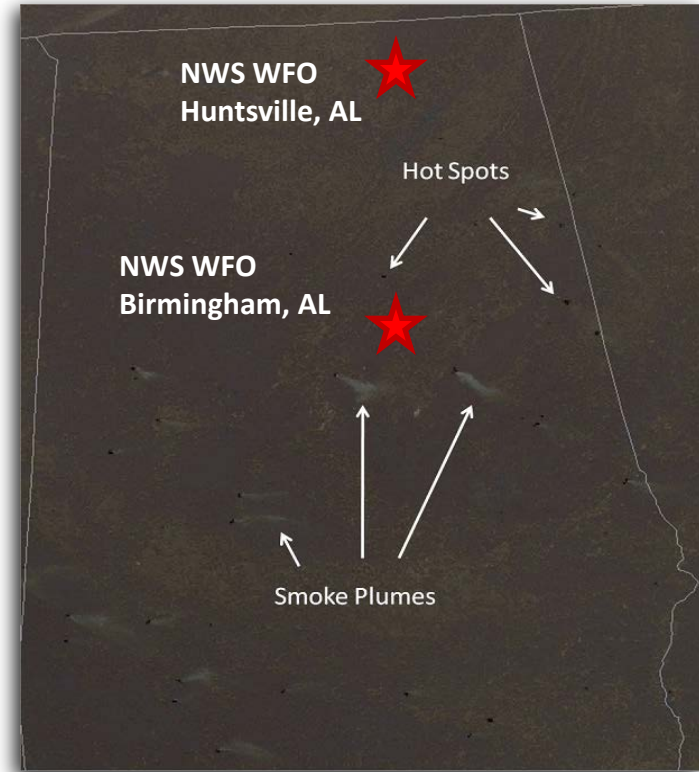
SPoRT’s transition of NASA satellite instruments provides unique or higher resolution data products to complement the baseline suite of geostationary data available to forecasters.



# Successes with MODIS



**AQUA MODIS True Color Composite**  
**4/25/10 Deepwater Horizon Incident**



**TERRA MODIS True Color Composite with 3.9  $\mu$ m**  
**11/20/08 Alabama Fires**

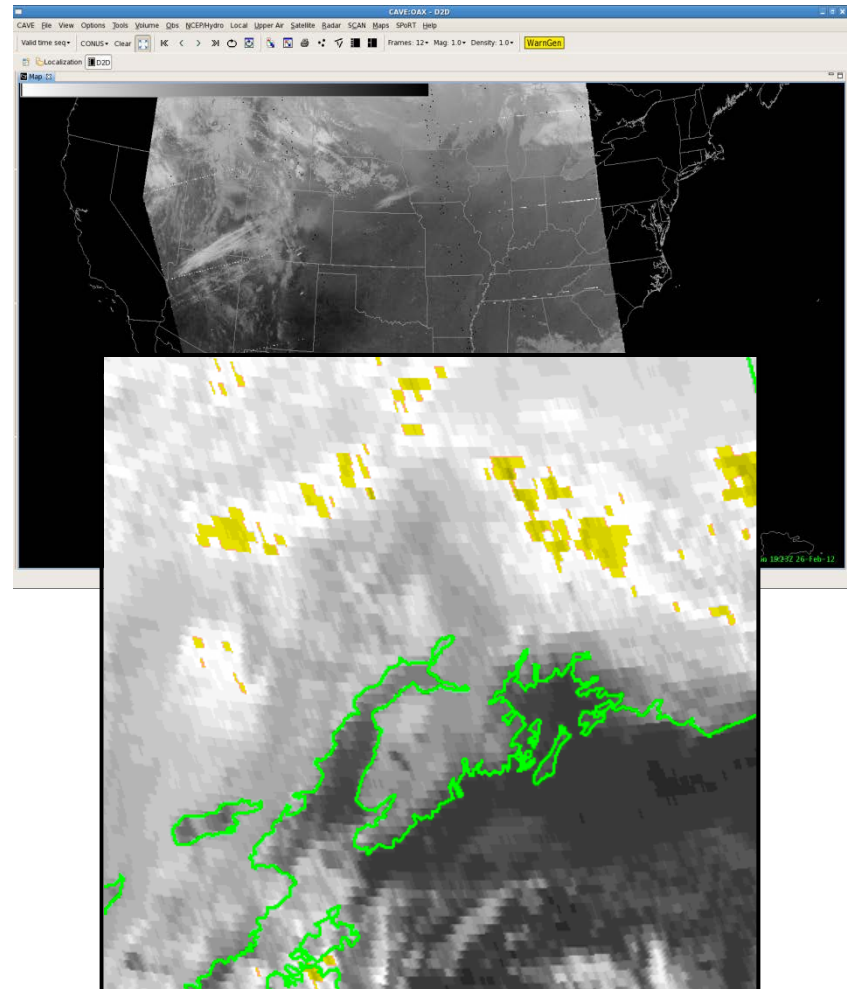
SPoRT's partnership with NWS WFOs provides them with unique imagery to support disaster response and local forecast challenges.

# Future Successes with VIIRS

FORECAST CHALLENGE	PRODUCTS	REGIONAL EMPHASIS
<u>Convective storm diagnostics</u>	SDRs, RGB products, cloud properties, cloud-top height, TPW, lightning	<u>CONUS</u> – selected SR and CR WFOs <u>OCONUS</u> – AK and HI
<u>Visibility and ceilings</u> – day and night changes with local variability	SDRs, RGB products, cloud products (base, cover, layers), low cloud/fog/snow discrimination, and AOT, glacier dust, volcanic ash, DNB	<u>CONUS</u> – selected SR and CR WFOs <u>Alaska Region</u>
<u>Various marine weather issues</u> – sea ice dynamics, freezing sea spray, winds, visibility, etc.	SDRs, RGB products, SST, ocean color, sea ice mapping and characterization, DNB	<u>Alaska Region</u>
<u>Local surface forcing</u> – local temperature forecasts, flooding due to snow melt/runoff	SDRs, RGB products, LST, snow cover / depth	<u>CONUS</u> – selected CR and WR WFOs <u>Alaska Region</u>

# Single channel swaths and Hybrids

- Traditional swath imagery is useful to forecasters. The higher resolution provides clarity over traditional GOES and, in many cases, MODIS.
- Hybrid imagery also maintains context of animated sequences



MODIS/VIIRS/GOES Hybrid IR Anchorage, Alaska  
1200 - 1445UTC 21 Nov 2012

# RGB Products

<i>RGB Product</i>	<i>MODIS Channels or differences for R, G, B</i>	<i>VIIRS Channels</i>	<i>SEVIRI Channels</i>	<i>Application</i>
<i>Air Mass</i>	<i>27-28, 30-31, 27 (inverted)</i>	<i>Cx-Cy*, Cz-M15, Cx (inverted)</i>	<i>6-7, 9-10, 6(inverted)</i>	<i>Jet Streaks, PV Analysis</i>
<i>Dust</i>	<i>32-31, 31-29, 31</i>	<i>M16-M15, M15-M14, M15</i>	<i>11-10, 10-8, 10</i>	<i>Differential Dust from Cloud</i>
<i>Night Microphysics</i>	<i>32-31, 31-20, 31</i>	<i>M16-M15, M15-I4, M15</i>	<i>11-10, 10- 5 , 10</i>	<i>Fog/Low Stratus, Thin Cirrus</i>
<i>Day Microphysics</i>	<i>2, 20 (solar), 31</i>	<i>I2, I4 (solar), i5(M15)</i>	<i>3, 5(solar), 10</i>	<i>Convective, Fog , Fire</i>
<i>True Color</i>	<i>1, 4, 3</i>	<i>M5, M4, M3 (or M2)</i>	<i>HRV</i>	<i>Smoke, Land Surface Changes</i>
<i>Natural Color (Land Cover)</i>	<i>6, 2, 1</i>	<i>I3, I2, I1</i>	<i>4, 3, 2</i>	<i>Ice/Water Cloud, Vegetation</i>
<i>Day Snow-Fog</i>	<i>2, 6, 20 (solar)</i>	<i>I2, I3, I4 (solar)</i>	<i>3, 4, 5</i>	<i>Snow Melt, Ice Jams</i>
<i>Day Convective Storms</i>	<i>27-28, 20-31, 6-1</i>	<i>Cx-Cy*, I4-I5(M15), I3-I1</i>	<i>6-7, 5-10, 4-2</i>	<i>Severe Weather, Water Vapor In/Outflow</i>

*Cx, Cy, Cz are corresponding channels from CrIS*

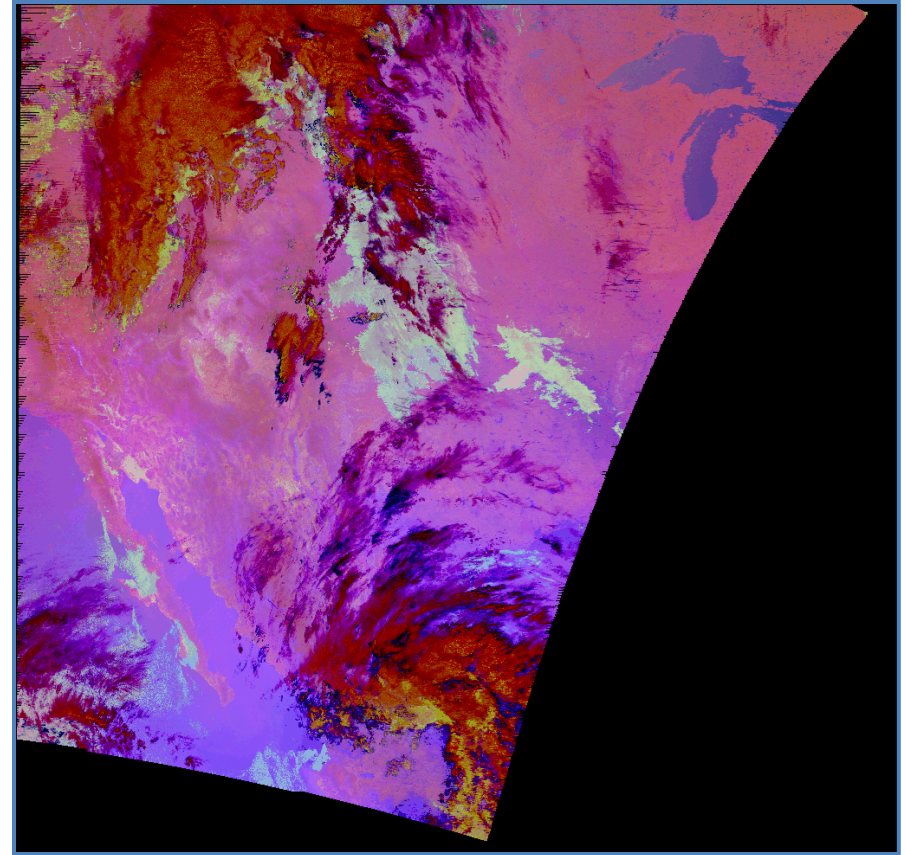
transitioning unique NASA and NOAA data and research technologies to operations





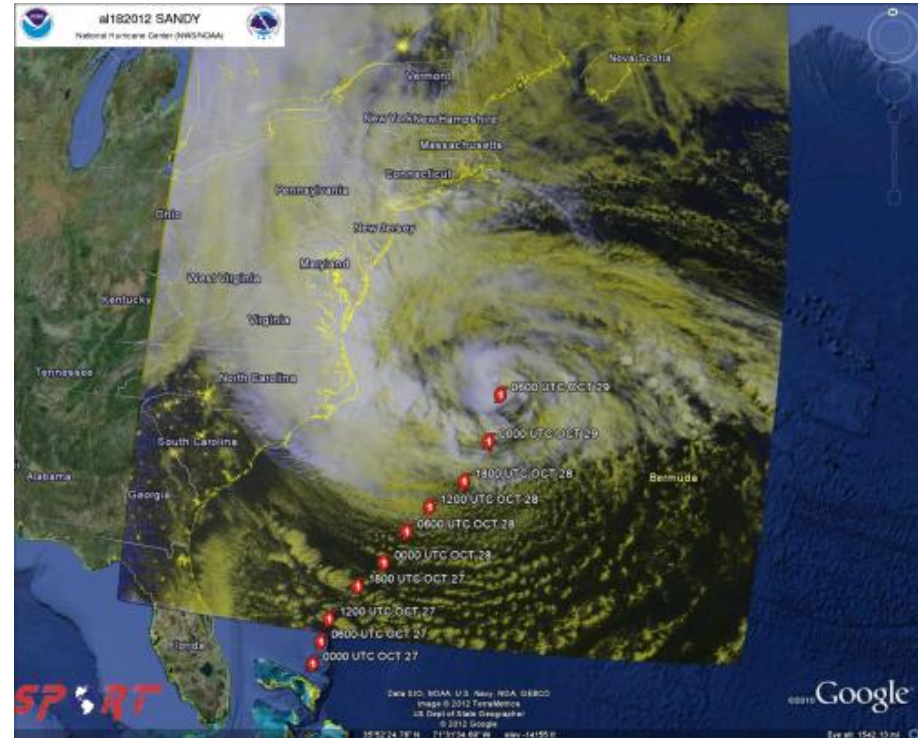
# VIIRS RGB imagery

- VIIRS Nighttime Microphysics imagery extends MODIS capabilities.
- Combines traditional single channel IR and 11-3.9  $\mu\text{m}$  difference imagery, plus an additional channel difference to highlight cloud microphysics.
- Result is highlight of low clouds and fog in light blue shades.



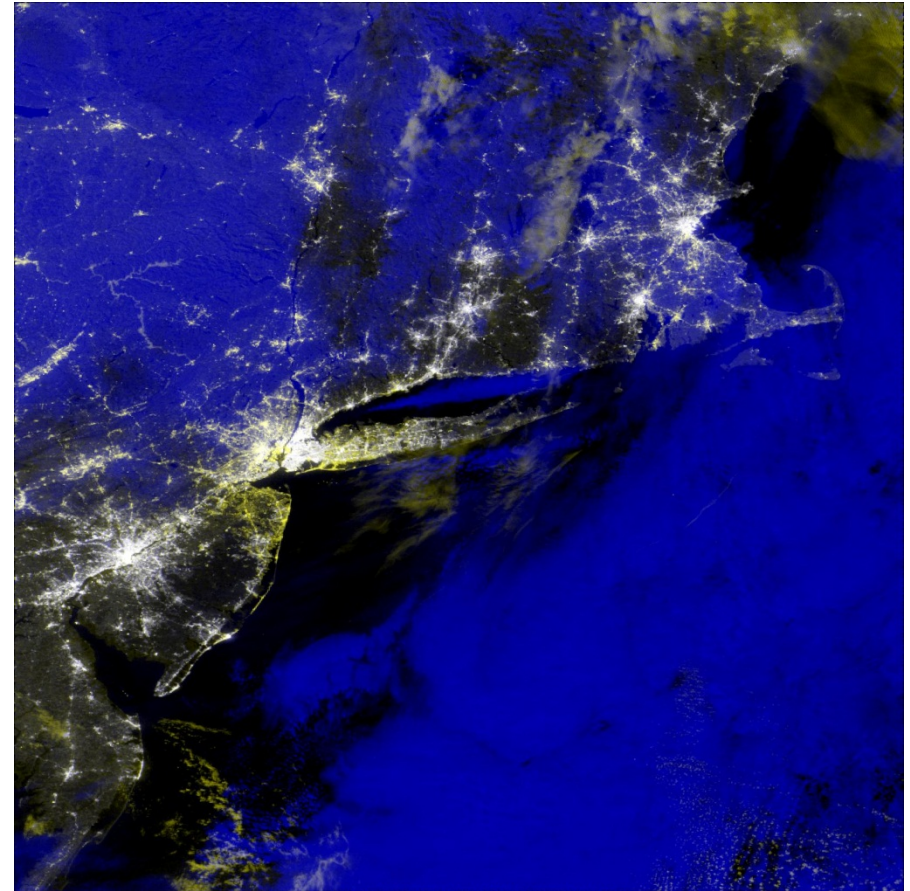
# VIIRS RGB imagery

- VIIRS Day-Night and Infrared composites combine moonlit reflectance and infrared brightness temperature.
- At night, helps to further discriminate low clouds (yellows) from higher clouds (blues) while retaining texture information from the visible imagery.



# Day-Night-Band Applications

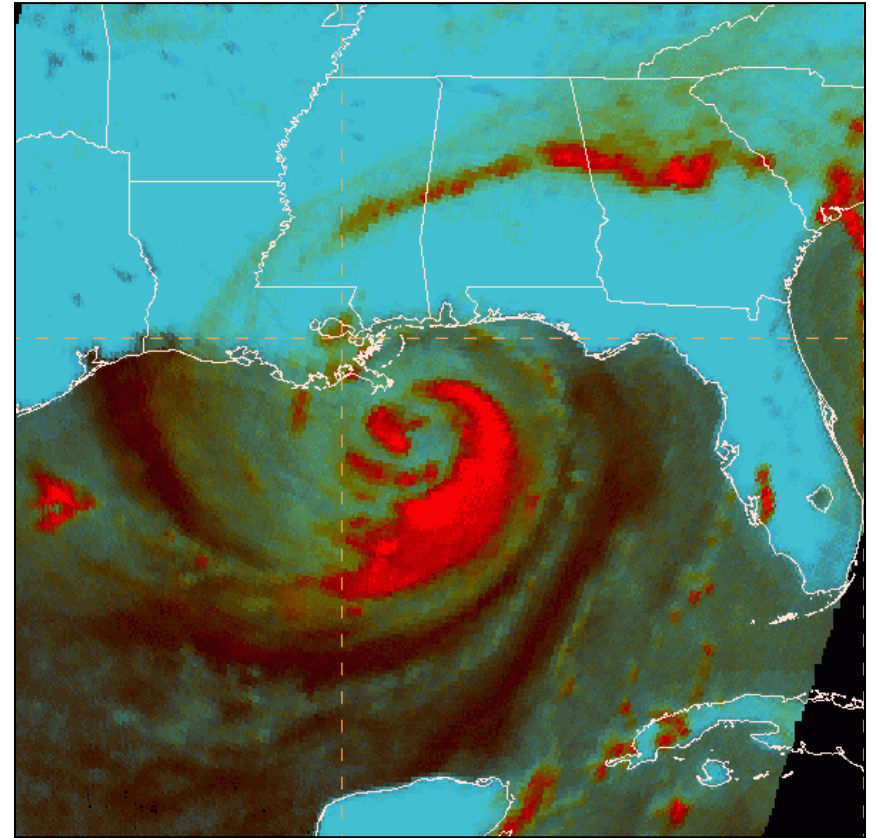
- Since the day-night band identifies city lights in addition to clouds, before-after comparisons can highlight outages.
- In this false color composite, yellows indicate areas where outages are likely following Hurricane Sandy.





# Other SNPP data products

- Advanced Technology Microwave Sounder (ATMS)
  - Passive microwave brightness temperatures can be used to identify tropical cyclone features through dense cloud cover.
- Ozone Mapper Profile Suite (OMPS)
  - Ozone concentrations can be used to monitor strengthening midlatitude cyclones, and aerosols to track the Saharan Air Layer.
- Cross-Track Infrared Sounder (CrIS)
  - Supplemental water vapor bands to fill in spectral gaps on VIIRS and create additional products.
  - Also provides thermodynamic soundings for evaluation of severe weather parameters.



# Summary

- SPoRT has years of proven experience in developing and transitioning research products to the operational weather community
- SPoRT has begun work with CONUS and OCONUS WFOs to determine the best products for maximum benefit to forecasters.
- VIIRS has already proven to be another extremely powerful tool, enhancing forecasters' ability to handle difficult forecasting situations.



transitioning unique NASA and NOAA data and research technologies to operations

AGU Fall Meeting 7 Dec 2012

